

Demonstration Areas for Afforestation on Abandoned Agricultural Land in Lithuania

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Danish-Lithuanian Project 'Afforestation of Abandoned Agricultural Land based on Sustainable Planning and Environmentally Sound Forest Management'

1. Introduction

Since the start of the land reform in 1991, more than two million ha agriculture and forest land in Lithuania have been returned to 300.000 private owners. At the same time ½ mill ha has been abandoned as a result of the abolishment of centralised farming and adaptation to open market conditions. To ensure better land use the Lithuanian government with support from the Danish Ministry of Environment and Energy (DANCEE) carried out the project on "Afforestation of Abandoned Agricultural land" from 1999 to 2001.

The project focused on land use planning procedures and criteria and methods for afforestation. A specific project output was establishment of pilot areas on both public and private land in Lazdijai and Utena regions. **The pilot areas should test new and old afforestation techniques under various local conditions and demonstrate various forms of sustainable forest establishment.** This paper describes the methods used and the lessons learned from the pilot areas.

2. Establishment of pilot areas for demonstration

2.1 Selection of areas and owners

At the project start public land ownership was still unclear. However, at the end of 1999 land was handed over to the state forest enterprises and in close cooperation with Veisiejai and Utena forest enterprises 2 x 50 ha for pilot public afforestation were found.

Nearly one hundred private landowners responded to regional project meetings and a following newspaper advertisement. On average each owners wanted to afforest 3 ha, mostly on poor soils. The project visited more than 30 owners and selected six pilot areas in each of the two regions Lazdijai and Utena (total of 36 ha).

Rather than all pilot areas fulfilling the same set of criteria the areas should supplement each other to give the best possible demonstration effect, representing different soil types, landscapes, ownership types and afforestation purposes ranging from wood production to agro-tourism. Priority was given to areas difficult to farm (e.g slopes) and with easy access for study visits and other farmers. All selected owners agreed to allow interested persons access to their land.

As all areas had formerly been cultivated there were few biotopes important for biodiversity. However wetlands were rejected as pilot areas, as dense tree cover might diminish their biological value. All areas had been abandoned for 3-5 years and many areas close to existing forests contained natural regeneration that might form the basis for new forest biotopes.

2.2 Planning of the individual pilot areas

The first meetings clearly indicated that the wishes and economic abilities of the owners varied considerably. The project therefore developed different models for forest establishment **not just depending on soil type and terrain** but also on sustainability, surrounding nature habitats and owners preferences and financial means. The project philosophy was that thorough (but often expensive) soil

preparation, dense planting, intensive weeding etc. will produce timber of a certain quality. Cheaper methods (e.g. natural regeneration or sowing) may not produce the same quality timber, but may still produce good forests for both wood production and recreation.

A handbook for sustainable afforestation was made, including landscape and biodiversity considerations such as checklist of native species, recommendations for use of mixed stands, natural regeneration, wetland protection, establishment of forest edges and limited use of chemicals. A demonstration fund for the pilot areas was established and an agreement with two local forest owner cooperatives were made for them to act as entrepreneurs for the project.

Every pilot area owner participated in preparation of his/her individual plan for afforestation based on his/her vision and the local site conditions (soil type, fertility, landscape etc), so that the plan clearly reflected what, where, when and how to establish the owners "dream" forest and the total costs of the establishment. (Photo 1) Based on these plans agreements on soil preparation, seedlings, planting, weeding etc. were made between the project and the owner. Table 1 shows the different methods used in the pilot areas.



Photo 1. Land owners were very interested and active the planning process for their forest

Before afforestation each involved land owner submitted the plan and other relevant documents to the regional land survey division for approval according to the Decision of the Lithuanian Government Concerning Afforestation on Private Land (No. 425).

The state forest enterprises developed their own pilot area afforestation plans influenced by the discussions on planting and scarification methods and on mixed stands, forest edges, use of broad-leaved trees and the checklist of native species.

2.3 Establishment of a Project Demonstration Fund for the pilot areas

The Project Demonstration Fund was based on the principle that establishing pilot areas with afforestation experiments was a project cost, but - to encourage ownership and motivation for maintenance and protection - the owners should also contribute.

All establishment calculations were based on the same average model of 4000 Lt per ha as shown in Table 2. Each owner paid 20% of the total cost (800 Lt pr ha) or

Table 1. Method used on the pilot areas

*The Following methods were used on the pilot areas (methods marked * benefit biodiversity):*

Scarification

- Usual row ploughing (PKL)
- Row ploughing with agricultural plough
- Entire agricultural ploughing or planting without soil preparation *
- Deep ploughing with/without sowing of cover crops (e.g. rye, oat or lupines)
- Subsoil cultivation
- Soil preparation in plots (manual and mechanical)

Establishment

- Planting with spade, sword or drill
- Sowing of pine, birch or oak *
- Natural regeneration with/without soil preparation*
- Enrichment planting in natural regeneration *

Species compositions:

- Standard Forest enterprise mixtures
- Mixing of more than 2 species *
- Mixing in groups *
- Establishment of forest edges of indigenous species if available *

Different kinds of plant protection against wildlife

Table 2. Costs for establishment of pilot areas

LT/Ha	Year 1	Year 2	Year 3	Year 4	Sum
Scarification and/or Spraying	300				600
Protection		250	250		500
Seedlings	1600	200	200		2000
Planting	600	50	50		700
Weeding		100	100		200
Other					
Sum	2800	600	600		4000

contributed an equivalent amount of labour. After successful establishment and maintenance 10% (400 Lt pr ha) was returned. Farmers contributing more than 800 Lt pr ha (e.g. by doing everything him/herself) were compensated by the fund.

2.4 Implementation of the individual pilot afforestation plans.

Based on the afforestation plans the project and the local forest owner cooperative developed work plans to coordinate the work of the owners, the cooperatives and other entrepreneurs and to ensure timely seedling delivery and planting.

Before planting in early spring the project and the cooperatives organised local workshops on afforestation methods, biodiversity aspects, seedling quality and how best to prepare for and plant seedlings. Also additional workshops on maintenance and protection of newly established stands were organised. Nearly all selected owners attended, and all workshops were followed up by practical site visits.

2.5 Present and future use of the pilot areas for demonstration and research

The pilot areas were used for demonstration and discussion activities during project workshops and study tours including the International Afforestation Conference. Also local workshops organised by the Forest Owner Cooperatives used the areas. At project termination all information on the pilot areas were handed over to Lithuanian research institutions and the Department of Forestry and Protected Areas to be further used for research and demonstration.

3. Land Owners' attitudes and contributions

3.1 Background

According to a project survey among land owners the main obstacles for private afforestation were lack of support, lack of knowledge on silviculture and a complicated and little known permission procedure.

In Lithuania land holdings are generally small (average 11-12 ha), and many new owners have no agriculture/forestry practice and few resources to invest in the land. While some owners still carry on traditional agriculture many live far from their land and are not involved in farming. At the same time the agricultural situation (surplus of agricultural products and high operational costs) limits the interest for purchase or rent of agricultural land. Thus many owners see afforestation as an attractive alternative to unprofitable farming.

During the Soviet period all forestry activities were carried out by state foresters and information about forestry was in "professional" language, oriented towards highest possible growth potential. It is difficult to access and understand for ordinary land owners.

In 1999 new regulations for afforestation were under preparation and the regional authorities had not yet developed routines for how to deal with application for afforestation e.g. on better soils. No clear picture of the application procedure and the actual tax policy on agricultural land versus forest land existed.

3.2 Attitudes to afforestation

Although most owners had little former experience or information on afforestation nearly all had a clear vision of what they wanted to achieve, ranging from pure wood production to beautiful forests for eco-tourism or "for the future". However, few knew the real costs for afforestation.

Most owners preferred broad-leaved or mixed forest to pure conifer. Lime was particularly popular and many owners wanted lime or oak even on poor soils. The owners were aware that the areas might not be suited for pure stands of these species, but wanted broad-leaved trees in groups in the forest or along the edges for the benefit of wildlife and to be seen and enjoyed by both owners and visitors.

3.3 The contribution of owners, forest enterprises and forest owner cooperatives

The flexibility of the demonstration fund allowed individual owners different choices for contribution: Most owners living in towns planted and weeded and left the rest to the entrepreneurs. Older owners with limited working abilities paid full or nearly full price and undertook only

smaller tasks while active farmers did everything by themselves including scarification. (Photo 2)

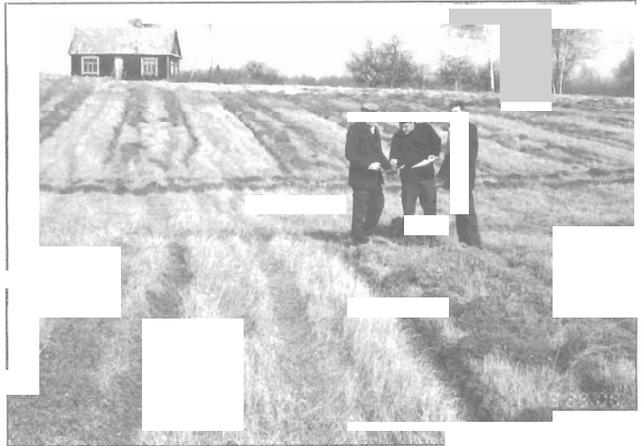


Photo 2. Scarification in rows using an ordinary agricultural plough (the cheapest solution for landowners)

The Forest owner cooperatives took an active part in establishment of the private pilot areas and organised courses and field visits both for the project and on their own initiative.

The forest enterprises already had well tested methods for reforestation and were more reluctant to invest in new methods especially those contradictory to Lithuanian forestry traditions for wood production. However they took this opportunity to test and compare different methods and carried out all practical work on their pilot areas.

4. Discussion - Experiences and Bottlenecks

4.1 Planning, application and training

The need for individual afforestation plans was immediately accepted by the owners and ensured good understanding and communication between the owners, the project, the forest enterprises and the forest owner cooperative.

As Afforestation Decision No. 425 prohibits afforestation on fertile agricultural land, change of land use purpose was needed for pilot areas on the better soils. Unfortunately such changes were related to many different laws (Land Law, Territorial Planning Law) of which some were contradictive to No.425. Different laws were interpreted in a different way in different regions and forced some owners to spend much time on bureaucratic procedures. For some pilot areas the approval procedure took more than one year and cost more than hundred Lt.

The training courses on planting and maintenance combined with practical field follow up visits were both essential and successful. Due to the workshops nearly all planting carried out in year 2000 was of high quality resulting in high seedling survival. Today the owners use their required skills and experiences in taking care of their forests.

4.2 Methods used for afforestation

4.2.1 Soil scarification

Scarification was one of the main project 'demonstration tests'. Row ploughing with double-plough (PKL) as

generally used by the forest enterprises in reforestation proved reliable and cost-effective on the pilot areas, but in areas with heavy grass cover mechanical or chemical weeding both before and after ploughing and planting was needed.

Ploughing in rows with an ordinary agricultural plough resulted easy planting conditions and good seedling survival. However, unless the plough was used in two directions to make a broad 'PKL-like' furrow the weed competition in the scar from the one furrow-plough became heavy. Also the agricultural plough created an uneven ground making future maintenance and weeding more difficult. Ploughing along the contour lines on slopes minimised the erosion risk. In pilot areas on sandy soil with entire agricultural ploughing or with planting without any soil preparation nearly all seedlings were killed due to the very dry conditions in the summer of 2000.

Deep ploughing with/without sowing of cover crops proved expensive but efficient on sandy soils with weed- and water supply-problems. The weed competition the first two years was low, and as their roots quickly reached water and nutrients, seedling survival was high and growth rate above normal. However, the cover crops attracted wildlife and increased the need for protection.

On clay soils where seedlings often fail to develop deep roots even after scarification autumn sub-soil cultivation was tested. During wintertime the soil drained and the lumps of clay broke down, so that the following spring planting was successful with high survival rate.

Soil preparation in plots gave promising results in hilly areas especially when combined with Round Up treatment. Weed competition was low at the beginning, but soon invaded the plots. On smaller areas the plot scarification was done with an ordinary spade. Both manual and chemical weeding was possible while the method limited the use of mechanical weeding.

4.2.2 Stand establishment

Most abandoned land in Lithuania will eventually develop into forest without any effort from the owner. However not all will fulfil the owners expectations concerning establishment time, quality or species composition as germination and survival rates is variable and species and provenance choice limited. The production quality (but not necessarily the quality for biodiversity) of the first generation forest may be low (e.g. dense black alder stands or pine stands with poor stem form and coarse branches).

The project looked into when and where natural regeneration can be recommended, supported and/or improved. Soil scarification close to old forests of pine, birch and black alder considerably improved the survival and density of natural regeneration. Scarification just before natural seed dispersion created the best possible germination conditions and limited weed competition. Enrichment planting of the same or of a more valuable species in already existing natural regeneration looks like a promising way to raise the value of the forest. Also the project included groups of natural regeneration in planted stands to save seedling cost and create a more diverse forest. (Photo 3)

Planting quality was improved by good quality spades and planting swords proved useful for small (1-2 year-old) pine seedlings on sandy soils.

The project had little success with direct sowing of pine, but direct sowing of oak proved both good and cheap. Nearly 100 % of the acorns germinated in a pilot plot on clay soil.



Photo 3. Artificial afforestation combined with natural regeneration

4.2.3 Species choice

Forest enterprise nurseries produced seedlings mainly for their own needs, typically conifers for reforestation. The availability of broad-leaved species from them and from private nurseries was very limited. Especially bushes and trees for forest edges were difficult to find. The seedlings for 136 ha of pilot areas had to be purchased from seven different nurseries of which some were quite far away. The transport reduced the vitality of the seedlings and was both costly and time consuming.

4.2.4 Plant protection

In the pilot areas damage from wildlife (mainly deer and wild boar) was reduced by protective tubes and to some extent also by repellents. The relatively costly and labour demanding tubes were mainly used to protect small groups of broad-leaved species in bigger areas of other species. Also fences made of local wood proved relatively effective compared to the longer lasting and less maintenance demanding but more expensive wire fence. Intensified hunting is another way to limit the browsing damage. However hunting licences in Lithuania belong to hunting clubs that may have other priorities than landowners. In some cases the cost of protection in the pilot areas accounted for 50 % of the total establishment cost.

5. Conclusions and Recommendation

Many land owners in Lithuania are interested in sustainable afforestation but have different capacity and visions for afforestation. It is therefore important that species and methods suited to varying site conditions, financial abilities and expectations for production and nature values are available – and that the advantages and limitations of the different methods are communicated to the owners.

The project has demonstrated that use of natural regeneration with or without scarification and improvement planting is cheap and biodiversity friendly. Although it limits the species and quality choice it is an obvious choice for many abandoned areas. When establishing forests by planting it should be noted that seedling survival depends as much on scarification, weeding and protection against wildlife as on planting technique. The traditional forest enterprise model is good and reliable, but the awareness of "new" methods, such as deep ploughing (expensive, but efficient on poor soils), sub-soil cultivation (particularly on clay soils), scarification in plots or direct sowing and use

of new species mixtures and forest edges should be raised all over the country.

To encourage afforestation in Lithuania incentives (e.g. state support) and extension is needed. It is important to ensure that the owners have a qualified choice, require new skills/experiences and take an active part in the establish-

ment of their forest. Also land use regulations need to be simplified and low cost afforestation models (such as sowing and use of natural regeneration) should be further investigated and adjusted. In this context the pilot areas could continue serving as test and demonstration areas.